What is claimed is:

1. A user-removable optical data recording cartridge comprising:

a first-surface optical recording medium having at least a first recordable and readable surface;

a cartridge body, with said medium positioned therein, so as to permit rotation of said medium about a first axis, said cartridge body defining at least a first window for permitting optical access to a portion of said medium for reading and writing on said medium as said medium is rotated;

wherein said portion of said medium includes at least an arcuate region to accommodate light from an objective end of an optics arm which is rotatable about an axis, different from said first axis.

2. A cartridge as claimed in claim 1 wherein said cartridge body includes at least a first window region over at least said arcuate region, covered by a plate which is transparent at a first wavelength.

3. A cartridge as claimed in claim 1 wherein said cartridge body is configurable between a first configuration substantially enclosing said recording medium and a second configuration exposing a portion of said medium for reading and writing on said medium as said medium is rotated

4. A cartridge as claimed in claim 3 wherein said portion of said medium exposed in said second configuration is a portion of said first surface of said medium and wherein a second, opposed surface of said medium is substantially unexposed in said second configuration.

5. A cartridge as claimed in claim 4 wherein said cartridge body is further configurable to a third configuration wherein said a portion of said second surface of said medium is exposed in said third configuration.

6. A cartridge as claimed in claim 1 wherein portions of both said first surface and said second surface are exposed when said cartridge body is in said second configuration.

7. A cartridge as claimed in claim 3 wherein said cartridge comprises a first window for exposing a portion of said medium and a first shutter movable from a first position when said cartridge is in said first configuration to a second position when said cartridge is in said second configuration.

8. A cartridge as claimed in claim 7 wherein said window has a transverse extent sufficient to accommodate at least partial insertion of said objective end of an optics arm through said window.

9. A cartridge as claimed in claim 1 further comprising a plurality of recesses formed in an edge surface of said cartridge for encoding characteristics of said medium.

10. A cartridge as claimed in claim 1 having a width and depth of about 35 mm and thickness of about 3 mm and wherein at least said first recordable and readable surface of said medium provides a data capacity of at least about 0.25 Gbytes.

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11. A method for optically recording data, comprising:

providing a user-removable cartridge having a optical first-surface recording medium mounted therein for rotation about a first axis, configured to provide optical access to at least a first arcuate region of said medium,

positioning said cartridge in a location adjacent an optical arm, said optical arm having an objective end and rotatable about a second axis,;

rotating said optical arm about said second axis to position said objective end aligned with a plurality of desired arcuate positions along said arcuate region;

rotating said medium about said first axis to position a plurality of desired medium positions in alignment with said objective end; and

providing laser light along said optical arm to said objective end for diverting from said objective end to said plurality of desired medium positions.

12. A method, as claimed in claim 11 wherein said cartridge provides a first shutter movable, via a mechanical linkage, from a first position, substantially sealing said medium in said cartridge, to a second position, exposing at least said first arcuate region of said medium.

13. A method, as claimed in claim 12, wherein, in response to said positioning, said linkage automatically moves said shutter to said second position

14. A method for optically reading comprising:

providing a user-removable cartridge having a optical first-surface pre-recorded medium mounted therein for rotation about a first axis, configured to provide optical access to at least a first arcuate region of said medium,

positioning said cartridge in a location adjacent an optical arm, said optical arm having an objective end and rotatable about a second axis;

rotating said optical arm about said second axis to position said objective end aligned with a plurality of desired arcuate positions along said arcuate region;

rotating said medium about said first axis to position a plurality of desired medium positions in alignment with said objective end; and

providing laser light along said optical arm to said objective end for diverting from said objective end to said plurality of desired medium positions; and

detecting at least a first characteristic of light reflected from said desired medium positions.

15. A user-removable optical data recording cartridge comprising:

a first-surface optical recording medium having at least a first optically readable surface;

means for covering said medium, so as to permit rotation of said medium about a first axis;

means for permitting optical access to a portion of said medium for reading data on said medium as said medium is rotated;

wherein said portion of said medium includes at least an arcuate region to accommodate light from an objective end of an optics arm which is rotatable about a axis, different from said first axis.

16. A cartridge as claimed in claim 15 wherein data is pre-recorded onto said medium.

17. A cartridge as claimed in claim 15 wherein said medium is a recordable medium.

18. A cartridge as claimed in claim 15, wherein said means for permitting optical access includes means for covering, configurable between a first configuration substantially enclosing said recording medium and a second configuration exposing said portion of said medium.

19. A cartridge, as claimed in claim 18, wherein said portion of said medium exposed in said second configuration is a portion of said first surface of said medium and wherein a second surface is substantially unexposed in said second configuration.

20. A cartridge, as claimed in claim 18, wherein said means for covering is further configurable to a third configuration wherein said a portion of said second surface of said medium is exposed in said third configuration.

21. A cartridge, as claimed in claim 15 wherein portions of both said first surface and said second surface are exposed when said means for covering is in said second configuration.

22. A cartridge, as claimed in claim 18, wherein said means for covering comprises a first window for exposing said portion of said medium and a first means for sealing.

23. A cartridge, as claimed in claim 22 wherein said means for sealing comprises a substantially transparent plate.

24. A cartridge as claimed in claim 22 wherein said means for sealing is movable from a first position when said means for covering is in said first configuration to a second position when said means for covering is in said second configuration.

25. A cartridge as claimed in claim 22 wherein said window has a transverse extent sufficient to accommodate at least partial insertion of said objective end of an optics arm through said window.

26. A cartridge as claimed in claim 15 further comprising means for encoding characteristics of said medium.

27. A cartridge as claimed in claim 15 having a width and depth of about 35 mm and thickness of about 3 mm and wherein each of said first and second recordable and readable surfaces of said medium provides a data capacity of at least about 0.25 Gbytes.

28. Apparatus for optically recording data, comprising:

a cartridge having a optical first-surface recording medium mounted therein for rotation about a first axis, and defining a first shutter movable, via a mechanical linkage, from a first position, substantially sealing said medium in said cartridge, and a second position, exposing at least a first arcuate region of said medium,

means for assisting in positioning said cartridge in a location adjacent an optical arm, said optical arm having an objective end and rotatable about a second axis, wherein, in response to said positioning, said linkage automatically moves said shutter to said second position;

means for rotating said optical arm about said second axis to position said objective end aligned with a plurality of desired arcuate positions along said arcuate region;

means for rotating said medium about said first axis to position a plurality of desired medium positions in alignment with said objective end; and

means for providing laser light along said optical arm to said objective end for diverting from said objective end to said plurality of desired medium positions.

29. Apparatus for reading optical data, comprising:

a cartridge having an optical first-surface medium mounted therein for rotation about a first axis, and defining a first window exposing at least a first arcuate region of said medium,

means for assisting in positioning said cartridge in a location adjacent an optical arm, said optical arm having an objective end and rotatable about a second axis;

means for rotating said optical arm about said second axis to position said objective end along said arcuate region;

means for rotating said medium about said first axis to position a plurality of desired medium positions in alignment with said objective end;

means for providing laser light along said optical arm to said objective end for diverting from said objective end to said plurality of desired medium positions; and

means for detecting changes in at least a first optical characteristic of light reflected from said medium.

30. Apparatus as claimed in claim 29 wherein said medium contains pre-recorded data.

31. A data recording medium comprising:

a substrate;

a optical recording layer coupled to said substrate, wherein said optical recording layer includes at least a first optical recording medium film;

wherein said recording layer and substrate are fashioned as a rotatable disk, said recording layer positioned with respect to said substrate such that said recording layer can be

optically read or written by providing a read or write beam, having a first wavelength, to an operational surface of said disk, without the need for said read or write beam to traverse through said substrate, and such that said optical recording medium film is spaced a distance from said operational surface which is less than about fifty times said wavelength, whereby said data recording medium is a first surface medium.

32. A data recording medium, as claimed in claim 31, wherein said recording medium film is a thermally-written, optically-sensed material.

33. A data recording medium, as claimed in claim 31, wherein said recording medium film is an optically-written material.

34. A data recording medium, as claimed in claim 31, wherein said recording medium film is substantially electrically conductive.

35. A data recording medium, as claimed in claim 31, wherein said recording medium is substantially panchromatic, permitting read or write operations at wavelengths between about 400 nm and about 1100 nm.

36. A data recording medium, as claimed in claim 31, wherein said recording layer comprises at least a second film selected from the group consisting of:

a reflective film;

a dielectric film; and

an adhesion film.

37. A data recording medium, as claimed in claim 31, wherein said recording medium film is at least about 20 micrometers from said operational surface.

38. A data recording medium, as claimed in claim 31, wherein said recording medium is grooved.

39. A data storage medium comprising:

a substrate;

a optical data storage layer coupled to said substrate, wherein said optical data storage layer includes at least a first optical data film;

wherein said data storage layer and substrate are fashioned as a rotatable disk, said data storage layer positioned with respect to said substrate such that said data storage layer can be optically read by providing a read beam, having a first wavelength, to an operational surface of said disk, without the need for said read beam to traverse through said substrate, and such that said optical data film is spaced a distance from said operational surface which is less than about fifty times said wavelength, whereby said data storage medium is a first surface medium.

40. A data storage medium, as claimed in claim 39, wherein at least some data is pre-recorded on said data film.

41. A data storage medium, as claimed in claim 40, wherein at least a portion of said data film is writeable.

42. A data storage medium, as claimed in claim 39, wherein at least some servo features are pre-recorded.

43. A data storage medium, as claimed in claim 42, wherein said servo features include features selected from the group consisting of:

sector marking features;

track-following features;

identification information;

read test features; or

write test features.

44. A drive for reading data on an optical media disk, said disk defining a plane, comprising:

a spin drive for rotating said disk about a first axis;

an arm, having an objective end, mounted for rotating said arm about a tracking axis to position said objective end in alignment with any of a plurality of radial positions of said disk, said tracking axis being substantially parallel to and spaced from said first axis said objective end being spaced from said disk a distance of at least about 50 micrometers ; and

a laser light source configured to provide laser light along a path to said objective end of said arm and thence to said disk; and

an optical detector which detects light reflected from said disk.

45. A drive, as claimed in claim 44, wherein said arm is further mounted for controllably moving said objective end along a path to adjust the distance of said objective end from said disk for focusing said laser light.

46. A drive, as claimed in claim 44, wherein moving said arm for focusing is performed while maintaining said objective end and said laser light source in a substantially constant spatial relationship with respect to one another.

47. A drive, as claimed in claim 44, wherein said arm is mounted to provide for translation of said arm in a direction substantially parallel to said first axis.

48. A drive, as claimed in claim 44, wherein said arm is mounted to provide for pivoting of said arm about an axis substantially parallel to the plane of said disk.

49. A drive, as claimed in claim 44, wherein said drive has a mass less than or equal to about 0.05 kg.

50. A drive, as claimed in claim 44, wherein said drive fits within a rectangular envelope having a thickness less than or equal to about 10 mm.

51. A drive, as claimed in claim 44, wherein said drive fits within a rectangular envelope having a width less than or equal to about 60 mm.

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52. A drive, as claimed in claim 44, wherein said drive fits within a rectangular envelope having a depth of less than or equal to about 50 mm.

53. A drive, as claimed in claim 44 further comprising a drive controller interface, wherein said drive controller interface is a universal serial bus interface.

54. An optical data drive, comprising:

a spin drive for rotating an optical media disk about a first axis, said disk defining a plane;

an arm, having an objective end, said arm movable to position said objective end in alignment with any of a plurality of radial positions of said disk;

a laser light source configured to provide laser light along a path to said objective end of said arm and thence to said disk; and

a universal serial bus data interface for communicating data between said drive and a host device.

55. An optics assembly for use in conjunction with an optical data disk, comprising:

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a vertical cavity surface emitting laser (VCSEL);

a light detector; and

an optical relay system which guides at least some laser light from said VCSEL to a selectable region of said optical data disk and which guides at least a portion of reflected light from said optical data disk to said light detector.

56. An optics assembly as claimed in claim 55 wherein said VCSEL and said light detector are formed on a single integrated circuit substrate.

57. An optics assembly as claimed in claim 55 wherein said VCSEL and said light detector are mounted on a single substrate.

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58. Apparatus for use in connection with optical data storage, comprising:

a storage medium wherein data bits written thereon bits can be distinguished using reflected light, reflected from said storage medium;

a laser light source;

a detector;

an optical relay system which guides at least some laser light from said laser light source to a selectable region of said storage medium and which guides at least a portion of said reflected light from said storage medium to said detector;

wherein said laser light source and said detector are formed on a single integrated circuit substrate.

59. Apparatus, as claimed in claim 58, wherein said laser light source includes a surface emitting laser.

60. Apparatus, as claimed in claim 58, wherein said laser light source includes at least a first vertical cavity surface emitting laser (VCSEL).

61. Apparatus, as claimed in claim 60, wherein said VCSEL is used as at least part of said detector.

62. Apparatus, as claimed in claim 61, wherein said detector comprises a substantially radially symmetric arrangement which is substantially concentric with said laser light source.

63. Apparatus, as claimed in claim 61, wherein said detector is laterally spaced a first distance from said laser light source.

64. Apparatus, as claimed in claim 63, further comprising a birefringent material sized and shaped to laterally offset a reflected beam from said laser light source by said first distance.

65. Apparatus, as claimed in claim 63, wherein said first distance is less than or equal to about 0.05 mm.

66. Apparatus, as claimed in claim 61, wherein said apparatus occupies a volume defining a form factor of less than or equal to about 60 mm in width, less than or equal to about 12 mm in height and less than or equal to about 50 mm in depth.

67. Apparatus, as claimed in claim 61, wherein said storage medium is a rotatable disk.

68. Apparatus, as claimed in claim 67, configured to facilitate end-user removal and replacement of said disk.

69. Apparatus as claimed in claim 67, wherein said rotatable disk is at least partially covered by a cartridge.

70. Apparatus as claimed in claim 69, configured to facilitate end-user removal and replacement of said cartridge and disk.

71. Apparatus, as claimed in claim 61, wherein said detector provides a data signal.

72. Apparatus, as claimed in claim 61, wherein said detector provides a focus error signal.

73. Apparatus, as claimed in claim 61, wherein said detector provides a tracking error signal.

74. Apparatus, as claimed in claim 61, wherein said detector is a phi-detector.

75. Apparatus for optical data storage comprising:

a rotatable, user-removable disk;

a drive, couplable to said disk, for rotating said disk about a first axis;

an optics arm having at least a laser source, a detector, an objective and a focus actuator, and defining an objective end and a second end;

a tracking actuator, coupled to said arm to controllably rotate said arm about a second axis, substantially parallel to, but spaced from said first axis, to position said objective end at desired radial locations adjacent said disk.

76. Apparatus as claimed in claim 75 wherein the location and mass of components of said arm are such that said rotation about said second axis imparts a moment of inertia of less than or equal to about 5 $gm\text{-}cm^2$.

77. Apparatus as claimed in claim 75 wherein the location and mass of components of said arm are such that said rotation about said second axis imparts a moment of inertia of less than or equal to about 1 $gm\text{-}cm^2$.

78. Apparatus as claimed in claim 75 further comprising a prism.

79. Apparatus, as claimed in claim 78, wherein said focus actuator adjusts the distance of said detector from said prism.

80. Apparatus, as claimed in claim 75, wherein said focus actuator adjusts the distance of said objective end from said disk.

81. Apparatus, as claimed in claim 75, wherein said focus actuator comprises a piezo-motor.

82. Apparatus, as claimed in claim 75, wherein said laser source, detector and objective are all positioned with respect to said optics arm on the same side of said second axis.

83. Apparatus, as claimed in claim 82, wherein said laser source, detector and objective are all positioned substantially adjacent said objective end of said optics arm.

84. Apparatus, as claimed in claim 75 wherein each of said laser source and objective defines an optical axis and wherein the optical axes of said laser source and objective are coaxial.

85. Apparatus for optical data storage comprising:

a rotatable, user-removable disk;

a drive, couplable to said disk, for rotating said disk about a first axis;

an optics system having at least a laser source, a detector, and an objective;

a focus actuator for moving at least a portion of said optics system for adjusting focus of light from said laser source on said disk, wherein said moving is performed while maintaining at least said laser source and said objective in a fixed spatial relationship with respect to one another.

86. Apparatus, as claimed in claim 85, wherein a distance, along an optical path from said laser source to said objective, remains substantially constant during said moving for adjusting focus.

87. Apparatus for optical data storage comprising:

a user-removable disk, rotatable about a first axis, to define a disk plane;

a drive, couplable to said disk, for rotating said disk about a first axis;

an optics arm having at least a laser source, a detector, and an objective;

a focus actuator for controllably pivoting said optical arm about an axis substantially parallel to said disk plane for adjusting focus of light from said laser source on said disk.

88. Apparatus for optical data storage comprising:

a user-removable disk, rotatable about a first axis, to define a disk plane;

a drive, couplable to said disk, for rotating said disk about a first axis;

an optics arm having at least a laser source, a detector, and an objective;

a focus actuator for controllably translating said optical arm in a direction substantially parallel to said first axis for adjusting focus of light from said laser source on said disk.

89. A user-removable optical data disk, said disk having a diameter less than or equal to about 35 mm.

90. A disk, as claimed in claim 89, wherein said disk is at least partially hard-formatted.

91. A disk, as claimed in claim 89, wherein said disk is at least partially pre-recorded.

92. A user-removable cartridge for housing an optical data disk, said cartridge having a thickness less than or equal to about 3 mm a width less than or equal to about 40 mm and a depth less than or equal to about 40 mm

93. A cartridge, as claimed in claim 92, wherein said disk is at least partially hard-formatted.

94. A cartridge, as claimed in claim 92, wherein said disk is at least partially pre-recorded.

95. A drive for reading or writing data from or to an optical data recording disk, said drive having a thickness less than or equal to about 12 mm, a width less than or equal to about 55mm and a depth less than or equal to about 40 mm.

96. A user-removable optical data recording cartridge comprising:

a first-surface optical recording medium having at least a first optically recordable and readable surface;

a cartridge body, with said medium positioned therein, so as to permit rotation of said medium in said cartridge body.

97. A user-removable optical data recording cartridge comprising:

a first-surface optical medium having at least a first optically readable surface;

a cartridge body, with said medium positioned therein, so as to permit rotation of said medium in said cartridge body.

98. A user-removable optical data recording disk comprising:

a first-surface optical medium having at least a first optically readable surface having at least first data or servo features embossed therein.